FIG.1A

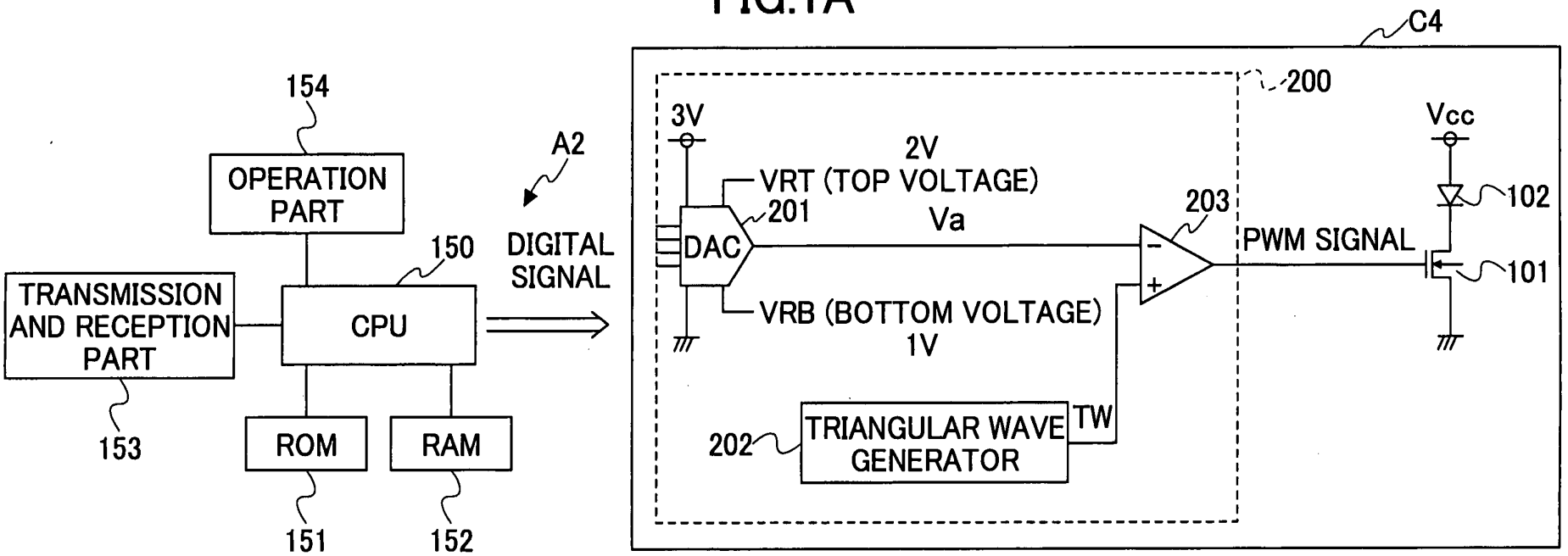


FIG.1B

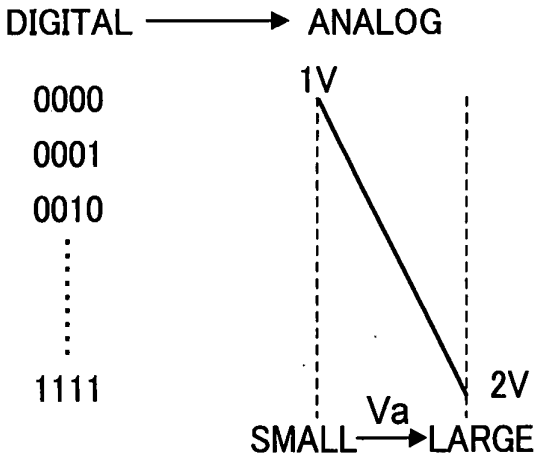


FIG.1C

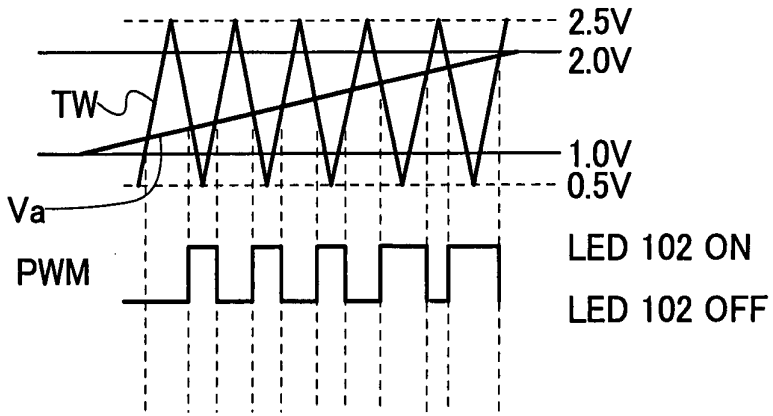


FIG.2

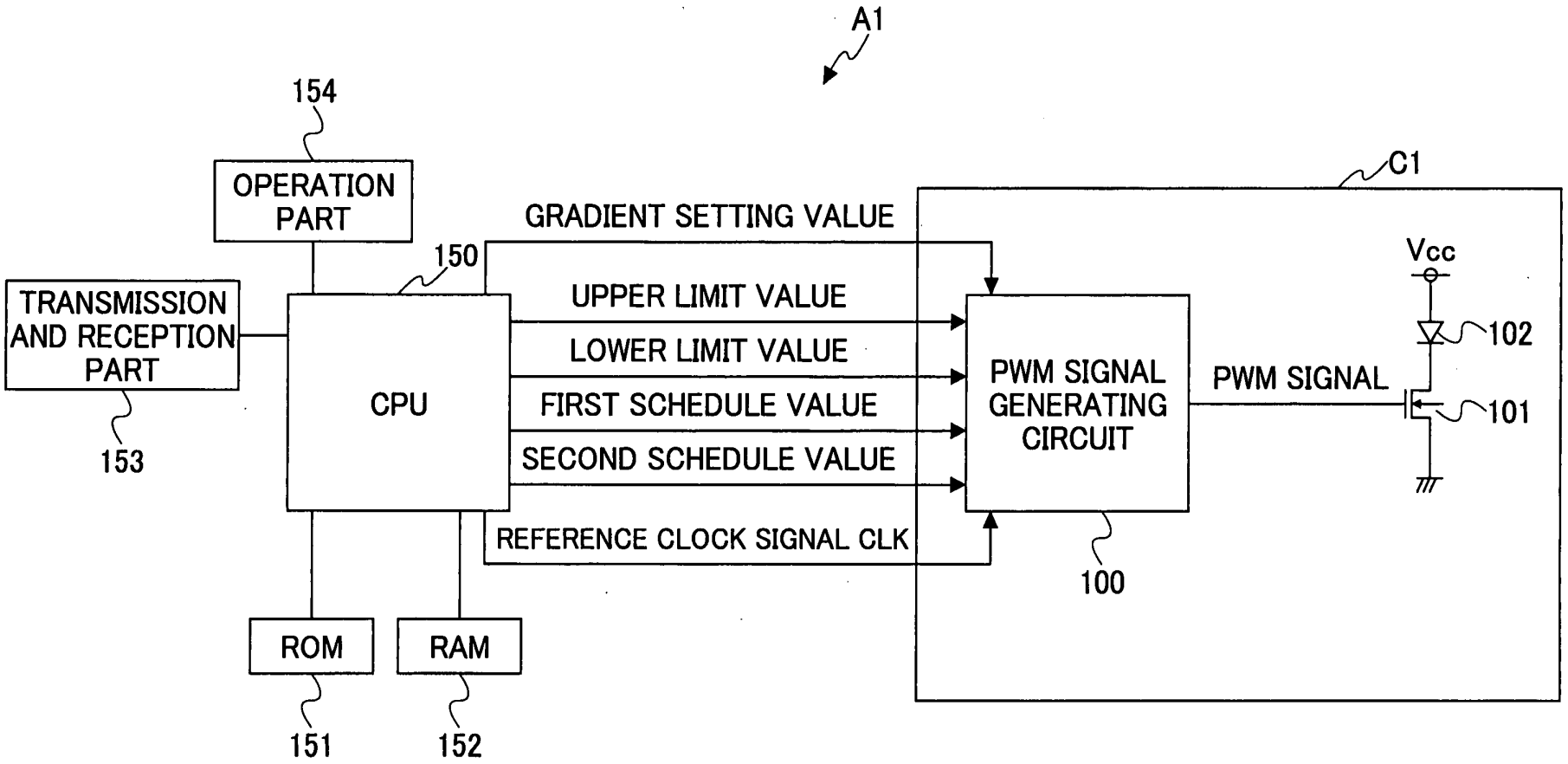

A1
154
OPERATION PART
C1
GRADIENT SETTING VALUE
150
Vcc
TRANSMISSION AND RECEPTION PART
UPPER LIMIT VALUE
LOWER LIMIT VALUE
FIRST SCHEDULE VALUE
SECOND SCHEDULE VALUE
CPU
PWM SIGNAL GENERATING CIRCUIT
PWM SIGNAL
102
101
153
REFERENCE CLOCK SIGNAL CLK
100
ROM
RAM
151
152

FIG.3

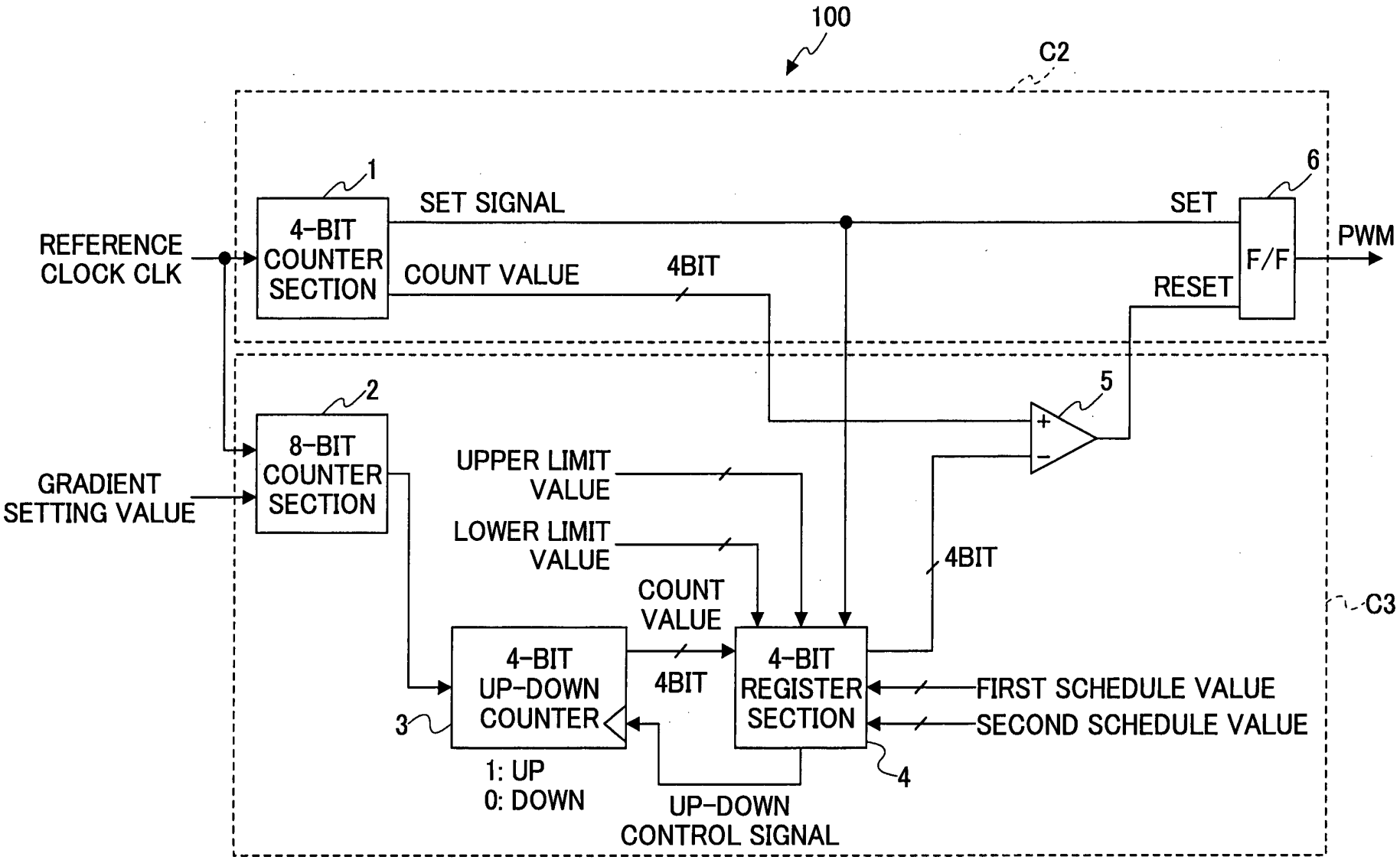

100
C2
1
4-BIT COUNTER SECTION
SET SIGNAL
COUNT VALUE
4BIT
REFERENCE CLOCK CLK
6
SET
RESET
F/F
PWM
2
8-BIT COUNTER SECTION
GRADIENT SETTING VALUE
5
+
−
UPPER LIMIT VALUE
LOWER LIMIT VALUE
4BIT
COUNT VALUE
C3
4-BIT UP-DOWN COUNTER
3
4BIT
4-BIT REGISTER SECTION
FIRST SCHEDULE VALUE
SECOND SCHEDULE VALUE
4
1: UP
0: DOWN
UP-DOWN CONTROL SIGNAL

FIG.4

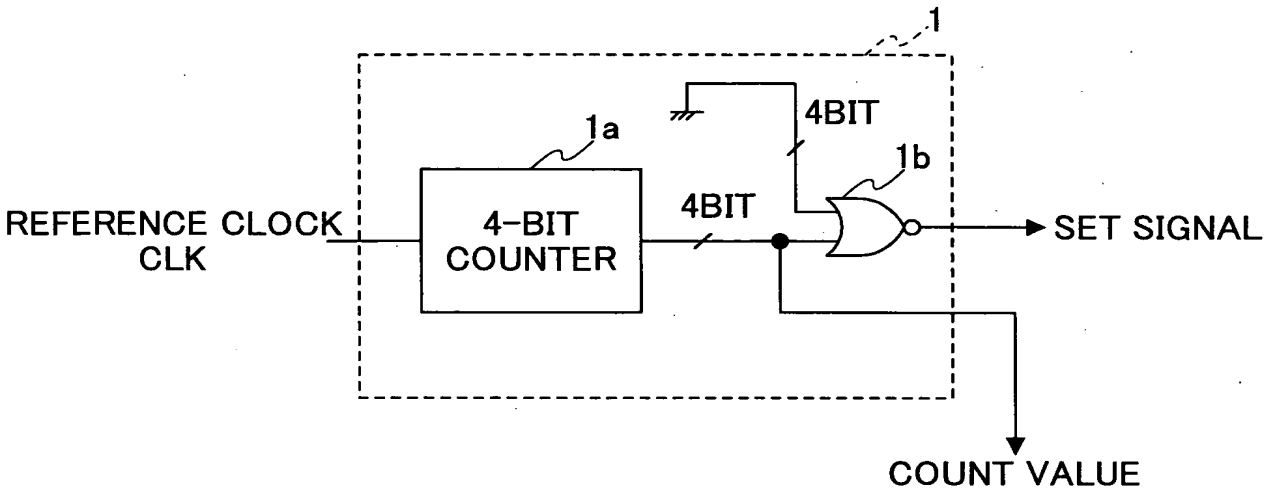

1
1a
4BIT
1b
REFERENCE CLOCK
CLK
4-BIT
COUNTER
4BIT
SET SIGNAL
COUNT VALUE

FIG.5

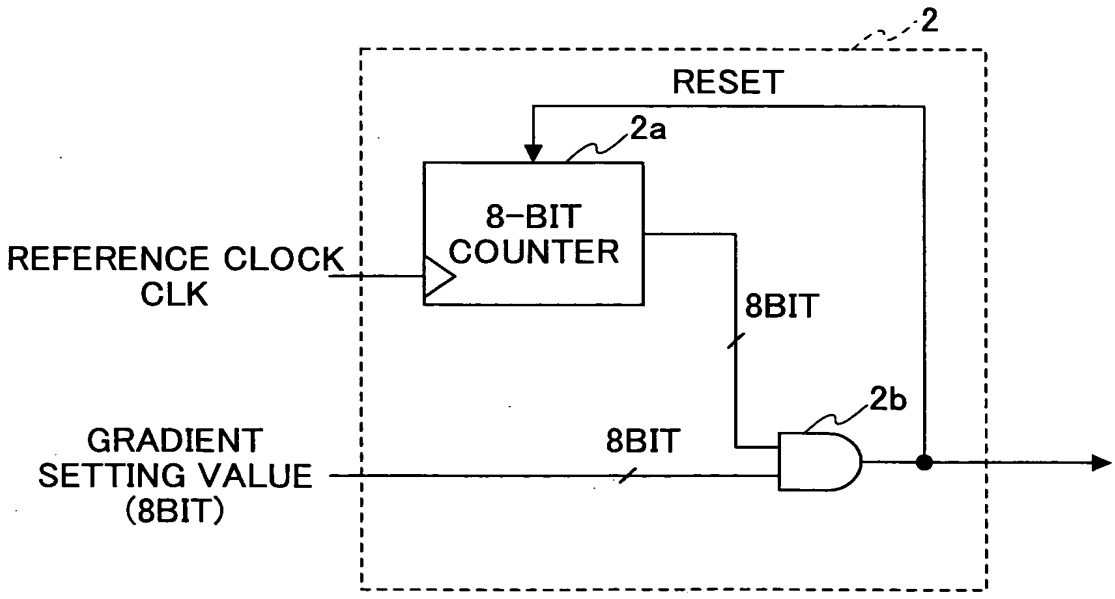

2
RESET
2a
8-BIT
COUNTER
REFERENCE CLOCK
CLK
8BIT
2b
GRADIENT
SETTING VALUE
(8BIT)
8BIT

FIG.6

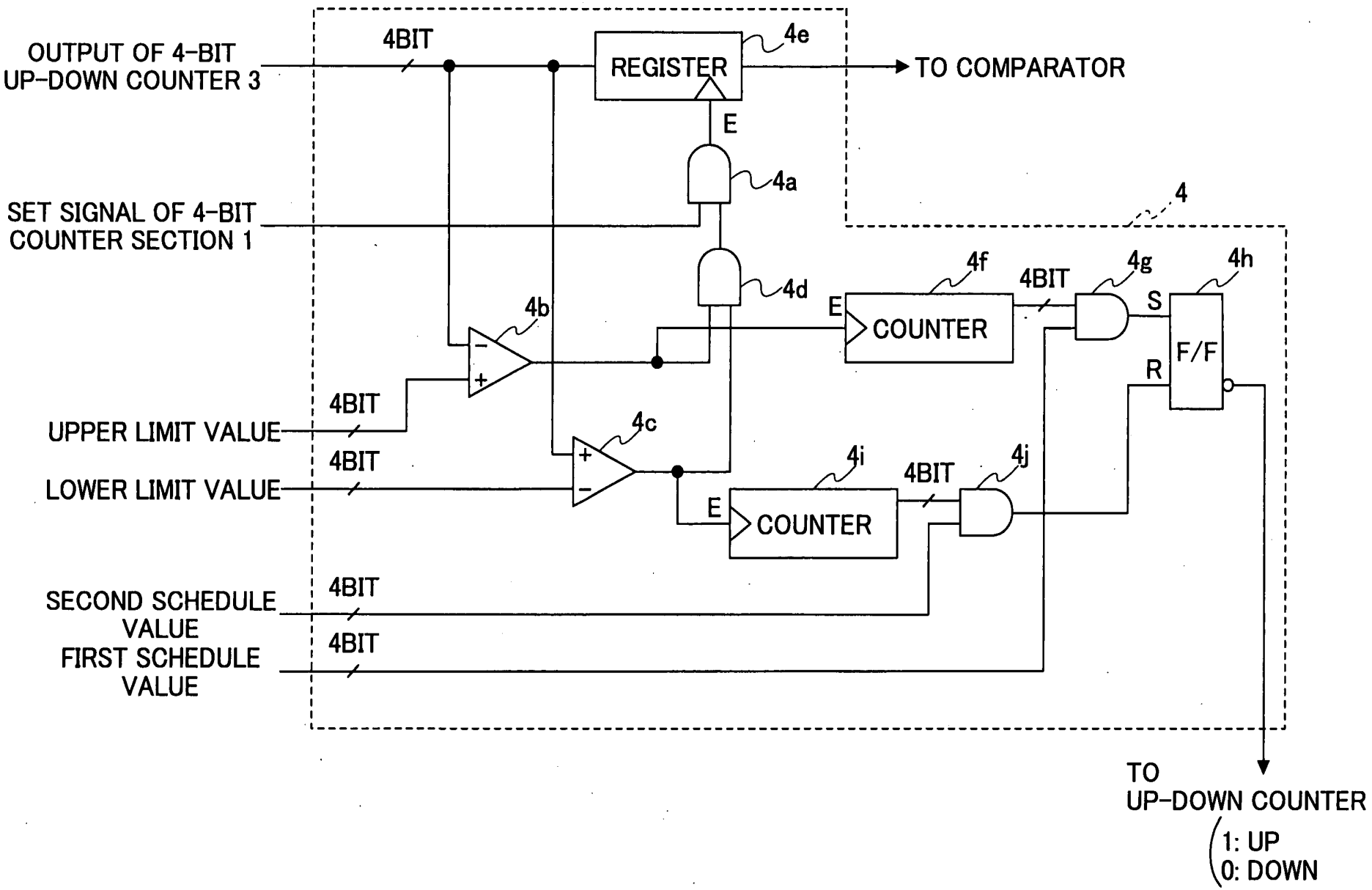

OUTPUT OF 4-BIT UP-DOWN COUNTER 3
4BIT
REGISTER
4e
TO COMPARATOR
E
4a
SET SIGNAL OF 4-BIT COUNTER SECTION 1
4
4d
4f
4BIT
4g
4h
4b
E
COUNTER
S
F/F
R
4BIT
UPPER LIMIT VALUE
4c
4BIT
LOWER LIMIT VALUE
4i
4BIT
4j
E
COUNTER
4BIT
SECOND SCHEDULE VALUE
4BIT
FIRST SCHEDULE VALUE
TO UP-DOWN COUNTER
1: UP
0: DOWN

FIG.7

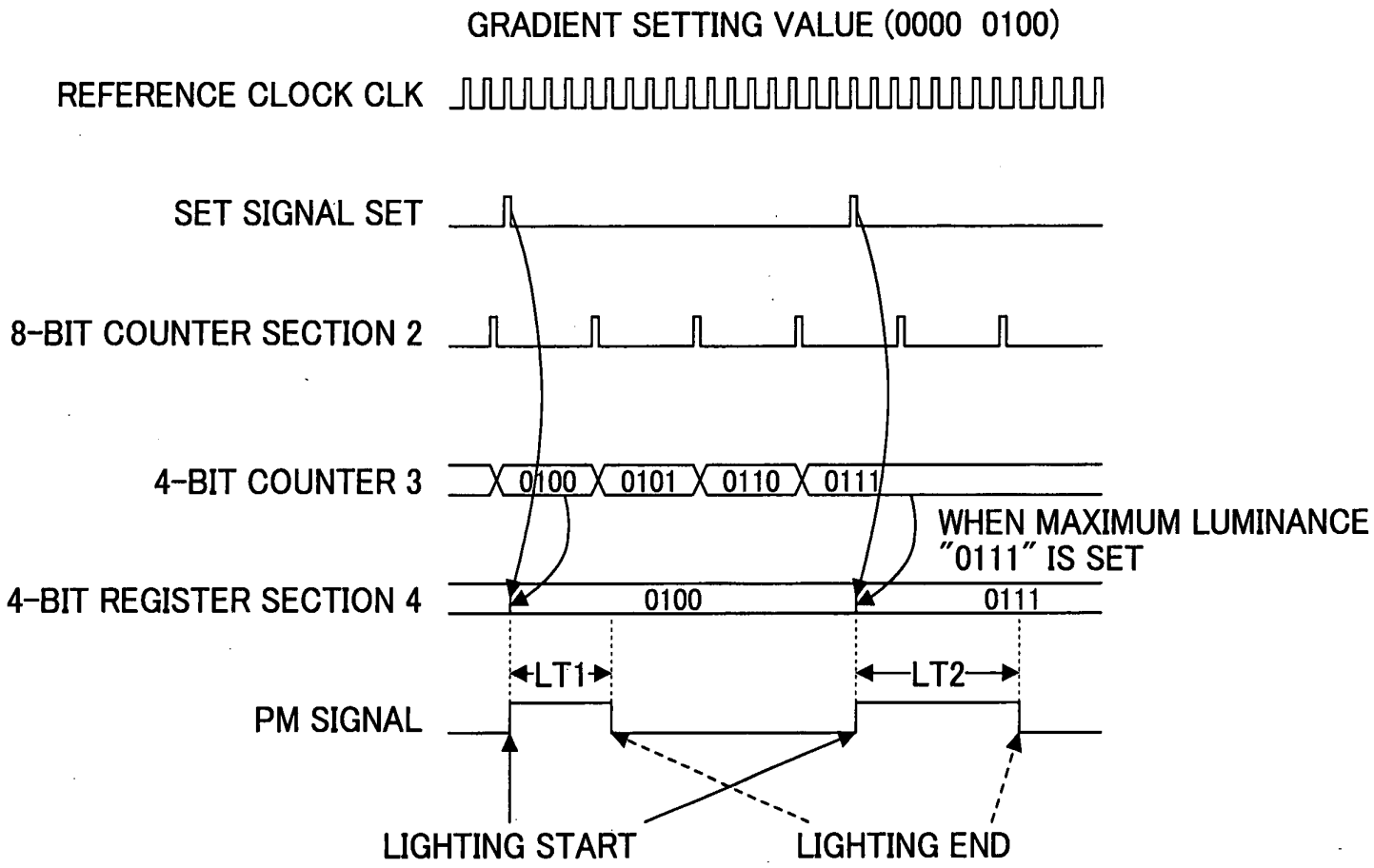

GRADIENT SETTING VALUE (0000 0100)
REFERENCE CLOCK CLK
SET SIGNAL SET
8-BIT COUNTER SECTION 2
4-BIT COUNTER 3
0100
0101
0110
0111
WHEN MAXIMUM LUMINANCE "0111" IS SET
4-BIT REGISTER SECTION 4
0100
0111
LT1
LT2
PM SIGNAL
LIGHTING START
LIGHTING END

FIG.8

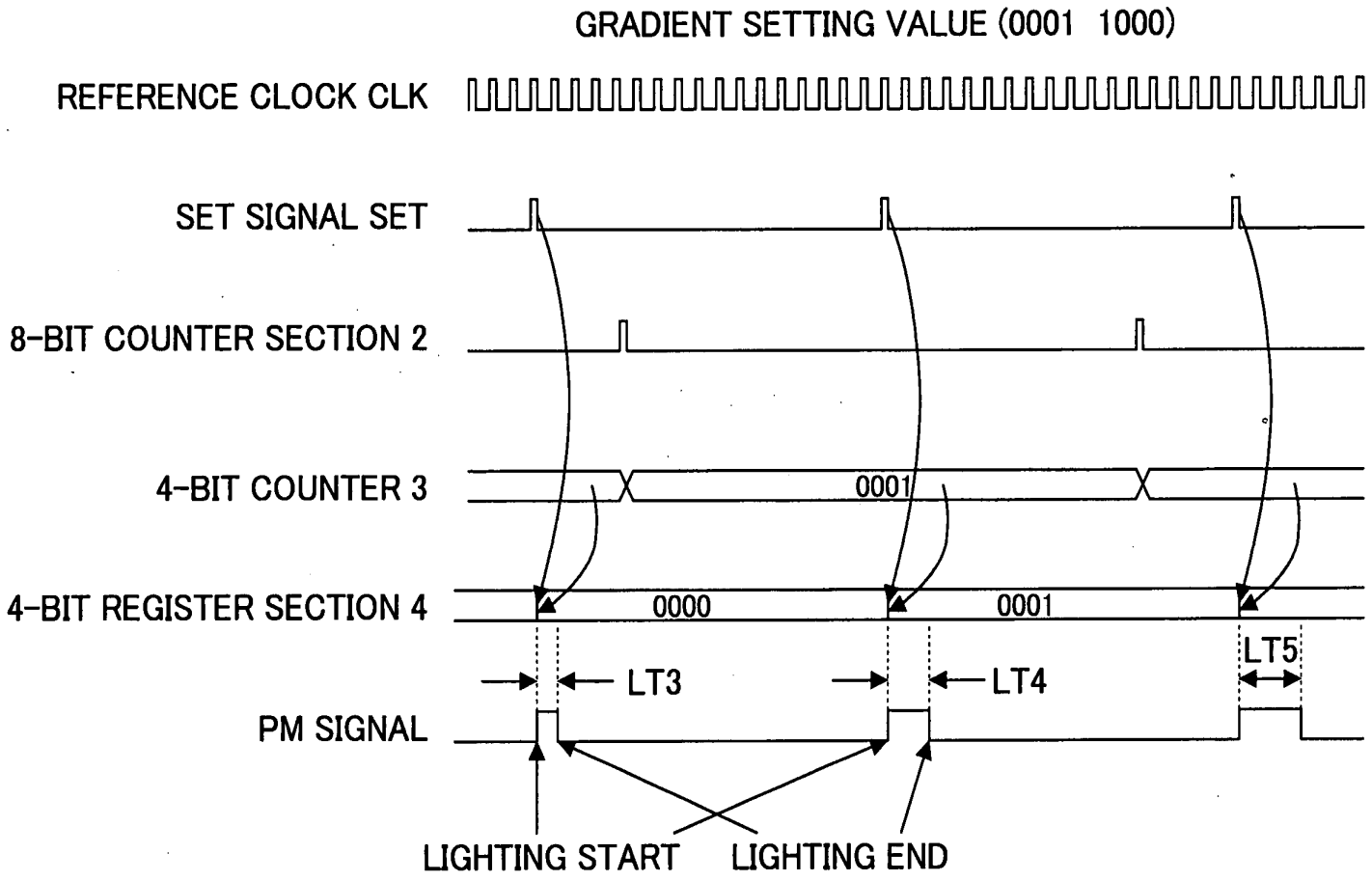

GRADIENT SETTING VALUE (0001 1000)
REFERENCE CLOCK CLK
SET SIGNAL SET
8-BIT COUNTER SECTION 2
4-BIT COUNTER 3
0001
4-BIT REGISTER SECTION 4
0000
0001
LT3
LT4
LT5
PM SIGNAL
LIGHTING START
LIGHTING END

FIG.9

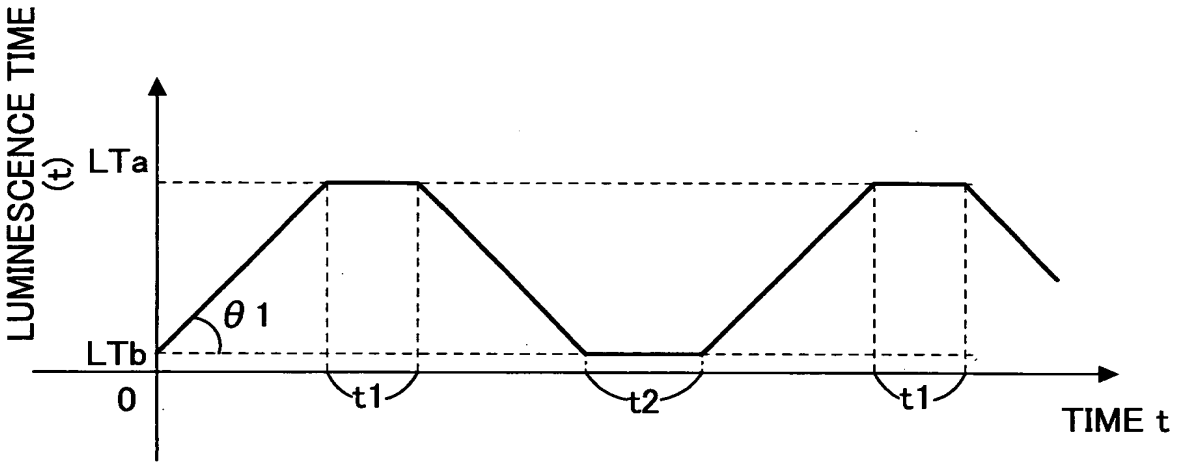
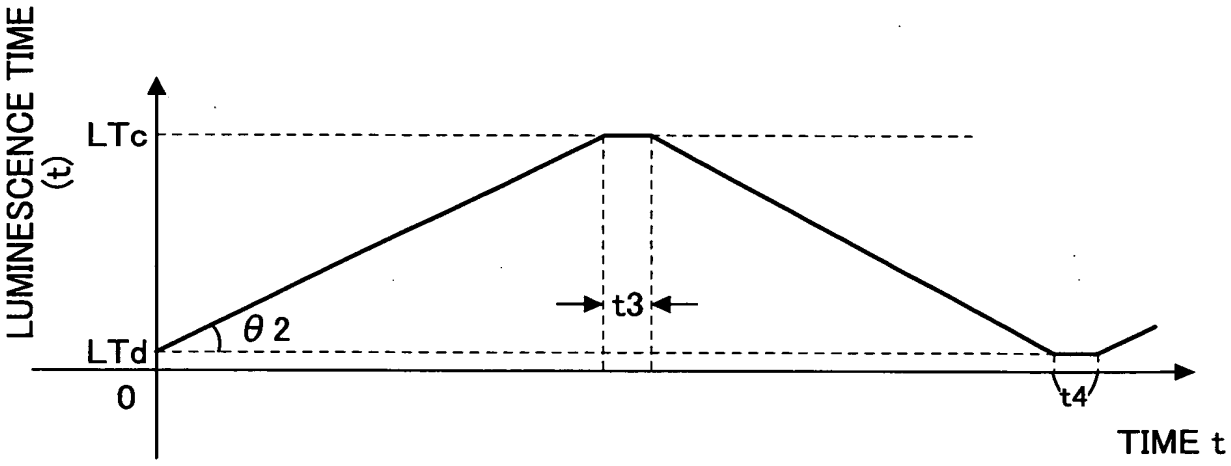

LUMINESCENCE TIME (t)
LTa
LTb
0
θ 1
t1
t2
t1
TIME t

FIG.10


LUMINESCENCE TIME (t)
LTc
LTd
0
θ 2
t3
t4
TIME t